Milam Landfill
Chain of Rocks Landfill
P.O. Box 637
East St. Louis, Illinois 62202
618/271-6788

A Waste Management Company

1630450001--St.Clair County
Milam LF CSCA
Permit

February 29, 1988

Mr. Robert W. Mueller
Assistant Attorney General
500 South Second Street
Springfield, Illinois 62706

Mr. William C. Child
Manager
IEPA-DLPC
2200 Churchill Road
Springfield, Illinois 62706

Re: Milam Landfill
Old Barrel Area Assessment

Gentlemen,

Please find enclosed the Old Barrel Area Assessment for the Milam Landfill. This document is submitted in accordance with item 4 of correspondence from William Child, dated June 25, 1987.

The hydrogeologic setting of the Old Barrel Area was found to be consistent with the findings of both the Contamination Assessment Plan and the Comprehensive Remedial Action and Removal Plan. The levels of contamination were found to be slightly higher in synthetic compounds and the conventional parameters were within expected concentrations.

The Old Barrel Area Assessment recommendations are also consistent with the recommendations from the Comprehensive Remedial Action and Removal Plan as listed below:

1. Minimize Infiltration
2. Leachate Extraction

Minimizing infiltration has been a goal since Waste Management acquired the site. Final cover is placed and vegetation established over the Old Barrel Area of the site. The Old Barrel Area Assessment recommends leachate extraction in two key areas, described as the "long pond" and the "horseshoe berm" areas. One leachate extraction well, LE-11, was previously constructed in the long pond area. The recommendations from the Old Barrel Area Assessment are about 75% inplace. Construction of the leachate extraction well in the horseshoe berm area can be accomplished within 30 days upon your approval.

Should any questions arise or clarification be needed regarding this matter, please call me at (618) 271-6788.

Very truly yours,

Glenn A. O'Bryan, P.E.
District Engineer

cc: Dick Houpt
Richard Kogler
Gerard Hamblin

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1.0 INTRODUCTION

1.1 Background

The Milam Sanitary Landfill is operated by Waste Management Inc. (WMI) of Illinois. It is located in St. Clair County, Illinois in Section 5, T2N, R9W, approximately 2.6 miles east of the Mississippi River and one mile north of East St. Louis. The landfill consists of two filled areas, the 104-acre Old Milam Landfill and the approximately 60-acre New Milam Landfill (Figure 1).

Old Milam was operated as a landfill until 1976; landfilling was permitted and initiated at New Milam coincident with the closing of Old Milam in 1976. Records indicate that prior to constructing new Milam Landfill, a part of the northwest section of New Milam had been used to store, handle, and bury barrels and drummed wastes.

This assessment of the Barrel Area at the Milam Sanitary Landfill was prepared as a supplement to the Comprehensive Remedial Action and Removal Plan (CRARP), dated November, 1986. The assessment was conducted in accordance with the Illinois Environmental Protection Agency (IEPA) letters dated June 25, 1987 and August 13, 1987. The letters are included in Appendix A.

1.2 Purpose and Scope

In the June and August letters, the IEPA required:

- Three additional monitoring wells be installed in the vicinity of the Barrel Area;
- Three twice-monthly sampling events of the new monitoring wells; and
- An assessment of the groundwater in the Barrel Area, including plans for remediation and/or containment.

The three specified monitoring wells were installed in August and September, 1987. The boring logs and well construction details are included in Appendix B. Twice monthly sampling was conducted in October 1987 and

November 1987. The sampling results are included in Appendix C. Three additional sampling events are being conducted in February, and March 1988 in conjunction with quarterly sampling of the other site monitoring wells.

The purpose of this report was to complete the third listed point above, to conduct an assessment of the groundwater in the Barrel Area and recommend practical remediation. The report is organized into six main sections. Section 2.0 describes the methodologies used to determine the location and size of the area affected by drum handling and burial at the site. In Section 3.0, the water water level data and sampling results are compiled in the context of the known geologic and hydrogeologic conditions at the site. In Section 4.0, the new data is synthesized to assess the nature of the groundwater impact resulting from the barrel area. In Section 5.0, several remedial alternatives are reviewed and assessed and recommendations are made concerning a practical and effective approach to remediation. References are listed in Section 6.0.

2.0 DELINEATION OF DISPOSAL AREA

On the basis of observations at the Milam Landfill Site, the IEPA identified the northwest part of New Milam Sanitary Landfill as the Barrel Area. A critical first step to assessing the Barrel Area was to reconstruct, to the best degree possible, the disposal methods employed, the lateral and vertical extent of the operation, and the time frame during which the operation took place. Figure 2 shows the boundaries of the horizontal extent of barrel disposal activity determined by this assessment. Two primary methods of investigation were used: evaluation of aerial photographs of the site, and collecting information from the IEPA concerning site activities.

2.1. Aerial Photographs

The Aerial Photography Summary Record System (APSRS) was used to obtain a record of aerial photographs taken in the East St. Louis area. Some additional aerial photographs were identified in WMI and IEPA files. The available aerial photos taken between 1956 and the present are summarized in Table 1. Copies of aerial photographs were obtained for years from the early 1960's to the late 1970's. These were used to examine the nature and extent of disposal activities across the site. They showed that the major activity in the Barrel Area started after 1971, and that barrel handling had ceased before 1976 when standard sanitary landfilling began.

Contour maps of the ground surface topography across the Milam site were obtained for 1969, 1971, and 1973 from Surdex Corporation, the photographic and cartographic company which had stereo pairs of photographs taken during the time span which the Barrel Area was active. A stereo pair was unavailable for 1975, so it has not been possible to construct a contour map.

The maps for 1969 (Figure 3) and 1971 (Figure 4) show little change in surface topography. In both, the general topography appears to be between 404 to 408 feet (AMSL). A horseshoe-shaped berm is identifiable encircling a 250-foot square area adjacent to Old Cahokia Creek. Two areas of standing water are identifiable. A small area of standing water, with surface elevation of about 407 feet is located inside the horseshoe berm. A larger pond oriented north to south shows an elevation of about 405 feet along the east side of the berm; hereafter it will be referred to as the long pond. These maps indicate that there was no progressive filling activity occurring in the area prior to 1971. An access road is apparent along the inside of the west arm of the berm in the 1971 photograph.

Table 1. Summary of Available Aerial Photographs.

Date of Photography	P #		Scale	Source	Area Shown
13-Jun-56	50	130		WMI	Milam area not shown
13-Jun-56	50	131		WMI	Both-pre landfill
13-Jun-56	50	132		WMI	Both-pre landfill
22-Sep-58	PR-223	4	1:9600	WMI	Milam area not shown
22-Sep-58	PR-223	5	1:9600	WMI	Milam area not shown
10-Jan-66	PR-1157	1	1:24000	WMI	Milam area not shown
10-Jan-66	PR-1157	32	1:24000	WMI	Both Old and New Milam
04-May-66	453	100		WMI	Both Old and New Milam
04-May-66	453	145		WMI	Milam area not shown
18-May-66	PR-1215	6	1:24000	WMI	Both Old and New Milam
18-May-66	PR-1215	7	1:24000	WMI	Both Old and New Milam
22-May-67	477	38		SURDEX	Both Old and New Milam
22-May-67	477	69.		SURDEX	Both Old and New Milam
20-Apr-69	548	100		SURDEX	New Milam and east part Old Milam
20-Apr-69	548	123		SURDEX	Both Old and New Milam
29-Mar-71	625	182	1:2000	SURDEX	Both Old and New Milam
04-May-73	738	128	1:2000	SURDEX	Too far south, Milam not shown
04-May-73	738	127	1:2000	SURDEX	Old and New Milam in center
04-May-73	738	101	1:2000	SURDEX	Too far west, Milam not shown
06-Apr-75	793	256	1:2000	SURDEX	Only Old Milam is on Photo
06-Apr-75	793	218	1:2000	SURDEX	Barrel Area at upper edge
08-Apr-77	864	249	1:2000	SURDEX	Barrel Area at upper edge
09-Apr-77	864	18	1:2000	SURDEX	Old Milam and most of Barrel Area
07-Apr-78	R-2760	143	1:14400	WMI	Old Milam and west New Milam
07-Apr-78	R-2760	144	1:14400	WMI	Both Old and New Milam
07-Apr-78	R-2760	145	1:14400	WMI	Both Old and New Milam
04-Aug-80	R-3277	2	1:14400	IL.DOT	Too far west, Milam not shown
04-Aug-80	R-3277	3	1:14400	IL.DOT	Too far west, Milam not shown
23-Sep-81	R-3406	5	1:9600	IL.DOT	Too far west, Milam not shown
23-Sep-81	R-3406	6	1:9600	IL.DOT	Too far west, Milam not shown
25-Mar-83	1026	41	1:2000	SURDEX	Barrel Area at right edge
25-Mar-83	1026	74	1:2000	SURDEX	Both Old and New Milam
28-Jan-85	R-3809	8	1:7200	IL.DOT	South Old Milam only
28-Jan-85	R-3809	9	1:7200	IL.DOT	South part of Old and New Milam
28-Jan-85	R-3809	10	1:7200	IL.DOT	New Milam only
28-Jan-85	R-3809	11	1:7200	IL.DOT	East part of New Milam
20-Apr-87	1134	12	1:2900	SURDEX	New Milam

In the 1973 map (Figure 5), the long pond is still identifiable, but the horseshoe berm appears to have been broken down, and there appear to be some small areas of infilling inside the berm. Several small areas of standing water are evident, and the access road is still apparent. The single aerial photograph available of the Barrel Area for 1975 shows light soil color in the Barrel Area, indicative that fresh earth work was occurring. The long pond was apparently still in existence. A contour map developed from 1977 aerial photographs indicates that landfilling had progressed on top of the Barrel Area.

2.2 IEPA Records

Visits were made to the Regional IEPA office in Collinsville and to the IEPA offices in Springfield to look at photographs and review files. Disposal operations in the Barrel Area were discussed with Mr. Kenneth Mensing, the Southwest Regional Manager of the IEPA. Mr. Mensing wrote many of the inspection reports and took many photographs of the site between 1973 and the present. IEPA representatives named McCarthy, Clark, and Adamson had also visited the site and made inspection reports. The following summarizes the findings from file review and discussions with Mr. Mensing.

The IEPA files contained many photographs taken at the Barrel Area between May 1973 and August 1974. These show numerous groupings of barrels standing at the site on several different dates. The groupings ranged in size from several dozen to perhaps a hundred barrels. Many barrels were dented and punctured; some photos showed un-sealed barrels lying on their sides with liquid and semi-liquid substances leaking out. Barrels were also photographed standing in shallow ponded water.

Reportedly, the Barrel Area started out as a storage area for filled drums; later the procedure was to cover the drums. An IEPA report dated April 10, 1974 states that the "last of the barrels were buried". However, photographs do indicate there was some further barrel activity at the site. Photos taken in July 1974 show more barrels standing on the site. A photograph taken on August 21, 1974 showed several barrels being hauled in on a flat bed trailer. Subsequent photos show empty barrels on the trailer.

A fire started during the afternoon of August 28, 1973. Drums were reportedly exploding. Photographs show several separate areas of burning drums and some burning brush. Earth moving equipment was used by site operators to bury the burning drums. Approximately 24 hours later, the fire was extinguished.

IEPA reports indicate that the drum disposal activities were not continued into 1975. WMI records indicate that the barrel area was capped to prepare Phase I of New Milam Landfill.

2.3 Summary of Drum Disposal Methods

It would appear that leaking and unsealed barrels were often delivered to the site and apparently buried in the Barrel Area. Once at the site, barrels were dumped from trucks, and sometimes crushed during covering. On several occasions, barrels were emptied onto the ground. During the fire, many barrels exploded and the contents burned.

Given these disposal practices, it is not appropriate to characterize the Barrel Area as an area containing intact barrels of waste material. Rather, it is likely that the liquid and sludge wastes brought into the site by barrel are distributed on the clay liner and intermingled with debris, flattened barrels and cover material. There are probably numerous barrel carcasses in varying stages of deformation within the Barrel Area.

3.0 RESULTS OF INVESTIGATION

3.1 Hydrogeology

A detailed characterization of the hydrogeology at the Milam Sanitary Landfill was presented in the Comprehensive Remedial Action and Removal Plan (CRARP). The following summarizes the findings from that investigation which are relevant to the hydrogeologic conditions in the vicinity of the Barrel Area.

The Milam Sanitary Landfill is located within the Mississippi River Valley in the physiographic province called the American Bottoms. It is a naturally flat region, consisting of the flood plain of the Mississippi River, infilling a bedrock valley. The bedrock, between 100 and 120 feet below the Milam Sanitary Landfill, is primarily limestone and dolomite of Mississippian and Pennsylvanian Age. Although it does contain some interbedded sandstone and shale, the rock unit has low permeability and poor water quality, so it has not been developed as an important aquifer (Schicht, 1965; p. 8).

Approximately 100 feet of fining-upward sands and gravels overly the bedrock. This sand and gravel deposit is the major groundwater-producing aquifer in the American Bottoms; it has been developed primarily for industrial purposes. At the New Milam site, 8 to 15 feet of silty clay alluvium cover the aquifer across most of the site. This alluvium forms the natural clay liner beneath the New Milam landfill. Water levels in the monitoring wells which are screened in the aquifer indicate confined aquifer conditions.

Groundwater elevations measured in site monitoring wells were used to develop potentiometric surface maps and hydraulic gradients for the CRARP. The potentiometric surface map indicated that the groundwater flow beneath the Milam Landfill is to the west southwest. The horizontal gradient of beneath the landfill as a whole was found to be approximately 0.0003 foot/foot. The gradient appeared to be locally steeper, with a value of 0.00055, in the region downgradient from the Barrel Area. Although potentiometric head values vary several feet throughout the year, the direction and magnitude of the gradient remain essentially the same.

Nested monitoring wells along the south side of the landfill were used to evaluate vertical gradients in the aquifer. There appear to be vertically downward gradients in the upper 30 to 40 feet of the aquifer, and vertically upward gradients from deeper in the aquifer. In general, the vertical gradients indicate vertical dispersion is likely to occur within the upper 40 feet of the aquifer.

Hydraulic conductivity (permeability) tests were conducted at six monitoring wells in the aquifer (CAP, 1986). These tests showed that the hydraulic conductivity increases with depth, which is consistent with the observed increasing grain size with depth. Near the top of the aquifer at elevation 385 feet (MSL) the permeability is approximately 1×10^{-2} cm/sec. Estimated permeability values increase to 2.5×10^{-2} cm/sec at elevation 375 feet, and to 5×10^{-2} cm/sec at elevation 355 feet.

Groundwater seepage rates beneath the landfill were calculated from these permeability values, the calculated horizontal gradient of 0.00055, and by assuming effective porosity of 0.25 for the sand aquifer (EPA, 1987; p. 74). Assuming these variables, it is estimated that the horizontal seepage velocity in the upper 30 to 40 feet of the aquifer is on the order of 20 to 100 feet per year beneath the Barrel Area.

The following leachate levels were measured at leachate wells in the Barrel Area during September 1986. Well locations are shown on Figure 2.

LEACHATE WELL	LEACHATE ELEVATION
L-1	408
L-2	406.5
L-6	430.1
LW-6	413.5

Natural groundwater level beneath the Barrel Area is at approximate elevation 400 feet. At the locations where these leachate elevations mark the top of the saturated zone, they represent pressure with the potential to drive leachate from the landfill.

3.2 Additional Monitoring Wells

The IEPA letters (Appendix A) required the installation and sampling of three additional monitoring wells in the vicinity of the Barrel Area. An additional monitoring well (G-6D) was nested adjacent to monitoring well GEI-6 to sample groundwater at a depth approximately 15 to 25 feet lower than the existing well. Another nest of two wells (G-18S and G-18D) was installed several hundred feet northwest of GEI-6, along the western boundary of the Barrel Area. Locations of the monitoring wells are shown on Figure 2. Boring logs and well construction details are presented in Appendix B.

3.3 Geologic Cross-Sections in the Barrel Area Vicinity

Geologic cross-sections were developed to aid in the evaluation of the aquifer geometry in the vicinity of the Barrel Area. Section A-A (Figure 6) is oriented west to east through the barrel area and Section B-B (Figure 7) is oriented generally south to north along Barrel Area. A cross-section location map is included on Figure 6. Each section shows the fine sand which makes up the upper part of the aquifer and the silty clay confining layer, which also acts as the landfill liner. Stick diagrams have been added to show the locations of the monitoring well screens and seals. The clay thickness decreases to the south and west. Cross-section B-B indicates that at both the western extreme and the southern part of New Milam, the clay may decrease to an approximately 8-foot thickness. Otherwise the two cross sections indicate that the natural silty clay deposit which makes up the landfill liner beneath the Barrel Area has a thickness generally greater than 10 feet.

Ground surface contours were extracted from the surface topography contour maps (Figures 3 - 5) and plotted on the cross-sections to show the changes in ground surface elevation between 1969 and 1973. Cross-section A-A shows that, at least until 1973, there was no significant filling activity south of the section line. Section B-B does show the construction of the horseshoe-shaped berm between 1969 and 1971. (Aerial stereo pairs are not available for plotting surface topography between 1973 and 1975).

3.4 Sampling Results for the New Monitoring Wells

Three sampling events were conducted at GEI-6 and each of the new monitoring wells (G-6D, G-18S, and G-18D). Water levels were also measured. The samples were analyzed by GC/MS for: priority pollutant volatile organic compounds, priority pollutant acid extractable organic compounds, priority pollutant base/neutral extractable compounds, and priority pollutant pesticides and PCBs. In addition, each sample was submitted for analysis of metals and groundwater conventionals. The DM-0L and DM-1H Forms which tabulate the detection limits and sampling results for all tested parameters are included in Appendix C.

Water level results (Table 2) indicate that there was a vertically upward gradient at the GEI-6 nest during the November 11, 1987 sampling event. Water levels results at well nest G-18 indicate that the gradient was vertically downward for the October 28, 1987 and November 11, 1987 sampling events. The horizontal gradients can not be calculated from this limited data, but it is

TABLE 2. Groundwater Elevations in the Vicinity of the Barrel Area.

Well #	Bottom Elevation	12-Nov 1986	20-Feb 1987	20-May 1987	20-Aug 1987	16-Oct 1987	28-Oct 1987	11-Nov 1987	N	Average	S.D.
GEI-4	383.2	400.02	398.90	399.02	398.52	-	-	-	4	399.12	0.55
GEI-5	383.4	400.05	399.22	399.22	398.76	-	-	-	4	399.31	0.47
GEI-6S	382.8	400.00	399.34	399.30	398.88	397.50	-	397.67	4	399.38	0.40
G-6D	366.6	*	*	*	*	-	398.09	397.93	2	398.01	0.08
G-18S	380	*	*	*	*	-	398.08	397.75	2	397.92	0.16
G-18D	365	*	*	*	*	-	398.01	397.34	2	397.68	0.33

NOTE:

Water levels obtained from DM-1H and DM-OL Forms (Appendix C)
- Water level not measured
* Sampling date prior to well completion

not unreasonable to assume that it is consistent with the previously determined values of 0.0003 to 0.00055. Table 2 also shows water levels for the previous year at existing monitoring wells in the area (GEI-4, GEI-5, and GEI-6). The levels at GEI-6 indicate that water levels beneath New Milam in November 1987 may have been more than two feet lower than the levels in November 1986.

Di-n-octyl phthalate (a base/neutral extractable organic compound) was detected at 55.2 parts per billion (ppb) at monitoring well G-18S in the October 29, 1987 sampling event. Otherwise, there were no priority pollutant base/neutrals, acids, pesticides, or PCBs detected in any of the three replicate groundwater samples from the monitoring wells downgradient of the Barrel Area. The results of priority pollutant volatile organic analysis and groundwater conventionals analysis do indicate that there is an impact on the groundwater downgradient of the Barrel Area. Table 3 tabulates each VOC occurrence at each monitoring well during the three sampling events. The table shows that six VOCs have been consistently detected at one or more of the downgradient monitoring wells. The specific concentrations of the six VOC detected for each sampling date at each well are summarized in Table 4, along with VOC results for the previous year's quarterly sampling at GEI-6.

At each monitoring well nest downgradient from the Barrel Area, the highest VOC concentrations have been detected in the well screened near the top of the aquifer (GEI-6S and G-18S). The VOC concentrations range from "not detected" to several hundred parts per billion. The deeper well at each location shows a similar suite of VOC, but at concentrations less than 20 ppb.

The results of metals analysis and groundwater conventionals analysis were evaluated and found to yield no additional information regarding the extent and magnitude of the Barrel Area impact. Therefore, detailed discussion of those analyses have not been included in this assessment report. The sampling and analytical results are are tabulated in the DM-1H and DM-OL Forms in Appendix C.

Table 3. Occurrence Matrix of VOC for 3 twice monthly sampling events adjacent to Barrel Area.

VOLATILE PRIORITY POLLUTANTS ug/L	Monitoring Wells G-6S	G-6D	G-18S	G-18D
Acrolein				
Acrylonitrile				
Benzene	3			
Bis(Chloromethyl)ether				
Bromoform				
Carbon Tetrachloride				
Chlorobenzene				
Chlorodibromomethane				
Chloroethane				
2-Chloroethylvinyl Ether				
Chloroform	1			
Dichlorobromomethane				
Dichlorodifluoromethane				
1,1-Dichloroethane	3	3	3	2
1,2-Dichloroethane				
1,1-Dichloroethylene	3		1	
1,2-Dichloropropane				
Cis-1,3-Dichloropropylene				
Ethylbenzene				
Methyl Bromide				
Methylene Chloride	2	2	1	1
1,1,2,2-Tetrachloroethane				
Tetrachloroethylene				
Toluene				
1,2-Trans-Dichloroethylene	3	3	3	3
1,1,1-Trichloroethane				
1,1,2-Trichloroethane				
Trichloroethylene	1			
Trichlorofluoromethane				
Vinyl Chloride	3		3	
Trans-1,3-Dichloropropylene				
NUMBER OF TIMES TESTED	3	3	3	3

Sampling Dates: October 16, 28, 1987
November 11, 12, 1987

TABLE 4. Results of VOC analysis in Barrel Area.

Well #	VOC ug/L	12-Nov 1986	20-Feb 1987	20-May 1987	20-Aug 1987	16-Oct 1987	28-Oct 1987	11-Nov 1987	N	Average ug/l	S.D.
GEI-6S	Benzene	201	81.6	86.1	63.5	17.6	18.5	13.8	7	68.9	61.1
	1,1-Dichloroethane	94.6	121	141	150	93.4	113	100	7	116.1	20.8
	1,1-Dichloroethylene	15.1	17.8	39	37.1	13.6	19.6	20.5	7	23.2	9.6
	Methylene Chloride	20.4	7.16	5.94	2.85	3.8	11.1	NA	7	NA	NA
	1,2-Trans-Dichloroethylene	207	527	746	736	193	218	166	7	399.0	244.0
	Vinyl Chloride	161	120	232	152	107	107	67.7	7	135.2	48.8
G-6D	Benzene	-	-	-	-	NA	NA	NA	3	NA	NA
	1,1-Dichloroethane	-	-	-	-	14.6	15.8	13.7	3	14.7	0.9
	1,1-Dichloroethylene	-	-	-	-	NA	NA	NA	3	NA	NA
	Methylene Chloride	-	-	-	-	3.53	NA	4.28	3	NA	NA
	1,2-Trans-Dichloroethylene	-	-	-	-	6.19	6.57	8.35	3	7.0	0.9
	Vinyl Chloride	-	-	-	-	NA	NA	NA	3	NA	NA
G-18S	Benzene	-	-	-	-	NA	NA	NA	3	NA	NA
	1,1-Dichloroethane	-	-	-	-	18.6	22.8	40.2	3	27.2	9.4
	1,1-Dichloroethylene	-	-	-	-	NA	NA	4.78	3	NA	NA
	Methylene Chloride	-	-	-	-	NA	NA	2.8	3	NA	NA
	1,2-Trans-Dichloroethylene	-	-	-	-	78.7	139	237	3	151.6	65.2
	Vinyl Chloride	-	-	-	-	94.2	219	117	3	143.4	54.3
G-18D	Benzene	-	-	-	-	NA	NA	NA	3	NA	NA
	1,1-Dichloroethane	-	-	-	-	4.81	NA	5.05	3	NA	NA
	1,1-Dichloroethylene	-	-	-	-	NA	NA	NA	3	NA	NA
	Methylene Chloride	-	-	-	-	NA	NA	4.59	3	NA	NA
	1,2-Trans-Dichloroethylene	-	-	-	-	19.8	13.6	17.6	3	17.0	2.6
	Vinyl Chloride	-	-	-	-	NA	NA	NA	3	NA	NA

NOTES:

VOC selection based on Table 3
Results obtained from DM-1H and DM-OL Forms (Appendix C)
- No samples collected prior to well completion
NA VOC not detected

4.0 IMPACT ASSESSMENT

4.1 Definition of the Problem

The best estimate of the extent of disposal activity in the Barrel Area is shown on Figure 2; it was derived by reviewing IEPA records and analyzing aerial photographs which spanned the landfilling activities at the Milam Landfills.

The IEPA records indicate that several hundred barrels, perhaps even a thousand, were disposed of in the barrel area between the beginning of 1973 and the end of 1974. The wastes disposed of were varied in nature, possibly containing solvents, metals, oils, and paints. It is possible all wastes are not contained within barrels.

Evaluation of photographs taken at the site by IEPA personnel and review of the aerial photographs and derivative topographic maps, showed no evidence that the natural clay liner was reduced by excavation within the Barrel Area. It appears that the original barrel storage, and subsequent barrel and waste burial occurred on top of the natural ground surface between elevation 403 and 405 feet.

4.2 Summary of the Hydrogeologic Setting

Waste disposal in the Barrel Area was conducted at approximately the natural ground surface. A silty-clay layer existed between the ground surface and the top of the underlying aquifer during the dumping activities; it acts as a natural clay liner beneath the site, having a thickness which is generally greater than 10 feet. Groundwater flow in the aquifer is to the west-southwest at a rate estimated between 20 and 100 feet per year. Without accounting for attenuation, a groundwater impact could have migrated from 300 to 1,500 feet horizontally downgradient from the source in the past 15 years. Vertical gradients indicate that the impact would be contained in the upper 30 to 50 feet of the aquifer, but that there could be significant vertical mixing within that upper zone. Leachate levels in wells constructed in the refuse above the Barrel Area indicate that there are liquid levels with the potential of causing leachate leakage through the clay liner.

4.3 Synthesis of Problem and Hydrogeologic Setting

The results of the recent sampling show that the groundwater VOC concentrations are lower for the three replicate sampling events than they were during the previous quarterly sampling events at GEI-6. The specific VOCs detected and their concentrations are quite similar at both shallow wells. In addition, there is an order of magnitude decrease in general concentrations between the shallow and deep wells at both locations in the replicate sampling results.

Although the VOC concentrations appear to be somewhat low when compared to results at GEI-6 during the previous year, the concentrations do not fall significantly outside the range of concentrations which have been detected since sampling began at GEI-6. It is possible that the lower concentrations were caused by the drilling for the new wells or they be related to the groundwater levels which appear to be lower than earlier in the year.

The data suggests that the results of the monitoring at GEI-6S and G-18S are characteristic of slow leakage from the Barrel Area and high attenuation as the leachate passes through the clay liner. The order of magnitude decrease in VOC concentrations at the deeper wells (G-6D and G-18D) is evidence of attenuation and dilution, although the effects of dilution are limited by the relatively low groundwater flow rate beneath the Barrel Area.

In summary, both the specific parameters and the concentrations of those parameters which constitute the impact upon the groundwater, are typical of generic landfill leakage.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Evaluation of Possible Remedial Measures

The appropriate remedial measures for the Barrel Area will be those which address a low level but relatively long-term impact. The range of possible remedial measures to mitigate groundwater impact can be classified into two basic groups: source control, and groundwater control (EPA, 1985; EPA, 1987). Source control techniques can be further subdivided into removal techniques and barrier techniques. Groundwater controls can be subdivided into perimeter containment, hydrodynamic controls, and withdrawal and treatment techniques.

5.1.1 Source Control

5.1.1.1 Removal. The general concept of source removal as it would be applied to the Milam site would be to remove existing liquid waste/leachate by pumping from several wells drilled to penetrate the landfill to the depth of the barrel area.

Removal of the leachate from the Barrel Area would have two benefits: first, the volume of the source material would be reduced, and second, the leachate levels within the landfill would be lowered, thereby reducing the driving force which is causing leachate leakage from the barrel area.

5.1.1.2 Barriers. Barriers would be designed to prevent or control groundwater flow into or through the waste material.

The landfill cap, already in place at New Milam acts as a barrier to the infiltration of precipitation, and therefore the formation of additional leachate. It is apparent from the sampling results, that the existing natural clay liner beneath the Barrel Area is limiting leachate leakage volume and significantly attenuating the leachate before it moves into the aquifer. Attempting to place barriers below the barrel area would not be constructable because the attempts would probably interfere with performance of the existing liner.

5.1.2 Groundwater Control

5.1.2.1 Perimeter Containment. The concept of perimeter containment is to place a low permeability structure around the impacted groundwater to limit further migration. General practice would be to use a slurry wall, a grout curtain, a vibrating beam wall, or sheet piling. These techniques would not

be practical at the Milam site where the zone of potential impact is located in the upper third of an aquifer which extends to a depth of greater than 100 feet. An effective perimeter system would require a low permeability bottom layer into which the wall or curtain could be keyed. Such a low permeability layer does not exist beneath the Barrel Area at an appropriate depth.

5.1.2.2 Hydrodynamic Controls. In hydrodynamic control systems, withdrawal wells and/or injection wells are used to alter the natural groundwater flow patterns such as to isolate the impacted groundwater zone from the rest of the aquifer.

A major disadvantage of hydrodynamic control systems is that they require continued active operation with continued energy input. Hydrodynamic controls do not treat the impacted groundwater or otherwise mitigate the impact, they only stop its movement. To be practical for a given situation, remedial measures which require energy input should also actively reduce the impact so that system shut down will be possible at some future date.

5.1.2.3 Withdrawal and Treatment of Groundwater. The purpose of pump and treat systems is to remove the impacted groundwater. Pump and treat systems were evaluated for the CRARP and found to be impractical for the character of impact and the hydrogeologic setting at Milam. The same factors are valid for impact below the Barrel Area. For the following reasons, development and operational costs for a pump and treat system would be very high and environmental benefit would be minimal:

- The high permeability of the aquifer would require a large number of wells pumping at high rates to affect the natural gradient, and therefore withdraw impacted groundwater.
- The levels of impact are relatively low in the groundwater beneath the site. The pumping rates and volumes required to remove the impacted water would further dilute the impact by drawing in non-impacted water from deeper and laterally.
- Treatment methods are generally not capable of totally eliminating an impact but rather, they are designed to reduce impact levels to some acceptable level. Sampling results have shown that existing concentrations of TDS, chloride, and sulfate at the downgradient landfill boundary are already close to the Illinois general water quality standards. Previous sampling results indicate that inorganic and organic impacts are significantly attenuated with depth and distance down gradient at this site.

5.2 Recommendations for Remediation

The most practical and effective remediation for the impact of the Barrel Area will be a combination of the source control methods discussed in Section 5.1.1 above. The final slopes and final cover of the section of New Milam Sanitary landfill which has been constructed above the Barrel Area will act to limit infiltration of precipitation, thereby limiting the formation of new leachate.

To remove the source of impact and reduce the head levels which drive leakage, leachate should be extracted from two areas of the Barrel Area: (1) in the long pond area (approximate coordinates 72,500E, 23,800N) and (2) inside the horseshoe berm area (approximate coordinates 72,250E, 24,300N).

An extraction well has already been constructed in the long pond area and is listed as LE-11 in the Leachate Removal Plan for Old Milam Sanitary Landfill, New Milam Sanitary Landfill, and Old Cahokia Creek (LRP). An additional well should be constructed within the horseshoe berm area. The well should penetrate to approximately 405 feet, the elevation of the top of natural clay liner. Drilling conditions may be difficult because barrel carcasses could impede or halt drilling progress above the target depth; several drilling re-starts could be necessary. The well should be constructed of 4-inch ID schedule 80 PVC. The screen length should be selected to extend the full saturated depth of the borehole. Typicals, showing well details, piping, and connections to discharge are provided in Appendix D.

Leachate extraction is currently being conducted at both at Old Milam Sanitary Landfill and other locations in New Milam. Consequently the collection system has already been established, and the treatment has been permitted. It will be necessary to analyze leachate from each new well location for waste characterization to determine if the facility which is accepting the current leachate pumpage can also accept the leachate from the Barrel Area.

Because of the slow groundwater seepage rate beneath Milam Landfill, it is unlikely that there will be an immediate change apparent in monitoring well sampling results. Sampling should be continued, at the wells at location G-6 and G-18. The results will be useful in assessing the effectiveness of this remedial plan.

6.0 REFERENCES

CRARP, 1986. Comprehensive Remedial Action and Removal Plan, Milam Sanitary Landfill, St. Clair County, Illinois; Warzyn Engineering Inc., Itasca, Illinois.

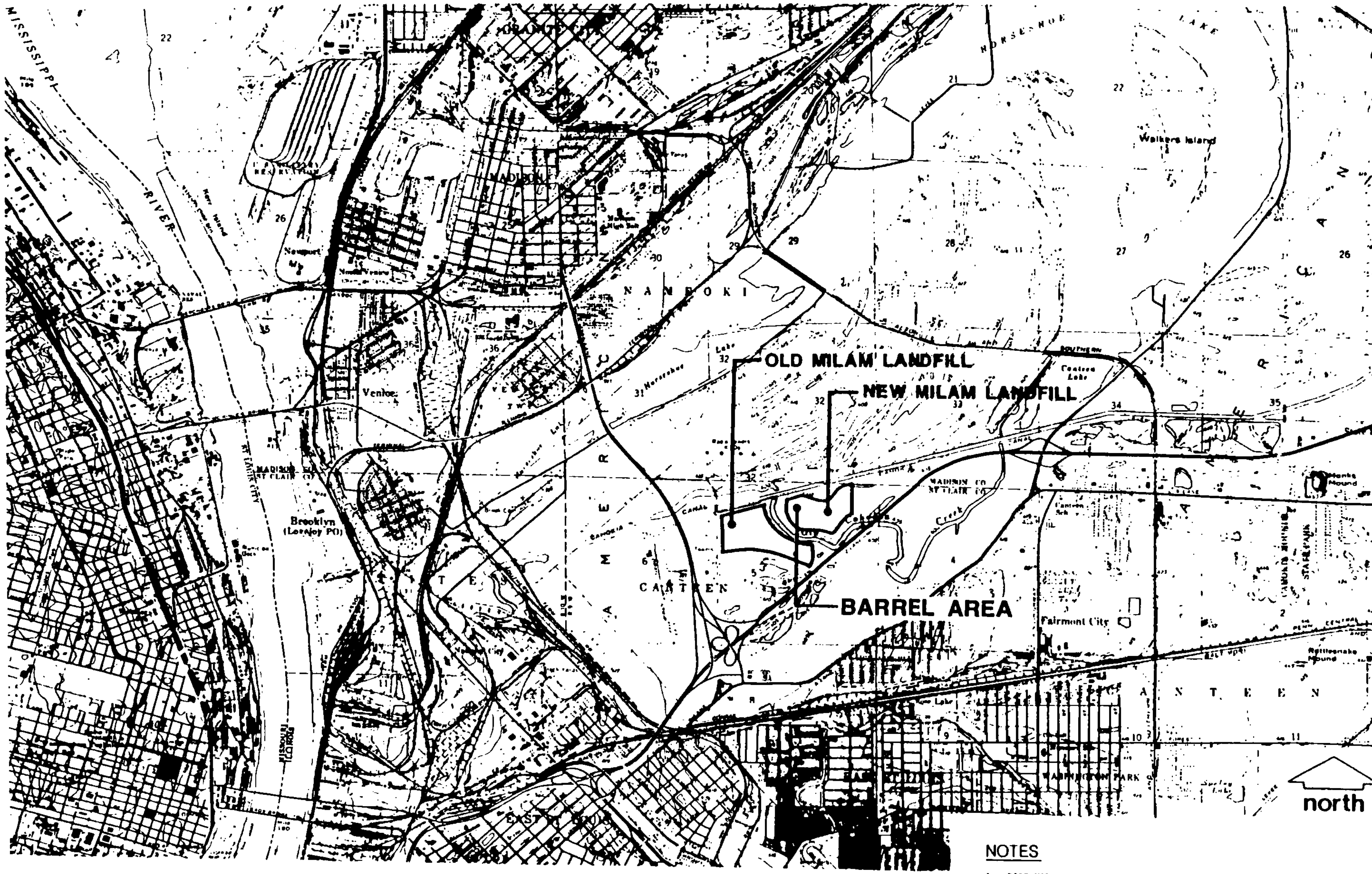
CAP, 1986. The Contaminant Assessment Report Milam Sanitary Landfill. Three volumes. GeoEngineering, Inc.; Denville, New Jersey

EPA, 1985. Handbook: Remedial Action at Waste Disposal Sites (Revised), EPA/625/6-85/006. U.S. Environmental Protection Agency, Cincinnati, Office of Research and Development, Hazardous Waste Research Laboratory, Ohio 45268.

EPA, 1987. Handbook: Groundwater, EPA/625/6-87/016, U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio.

Leachate Removal Plan, Old Milam Sanitary Landfill, New Milam Sanitary Landfill and Old Cahokia Creek, September 1987. Warzyn Engineering Inc., Itasca, Illinois.

Schicht, R.J., 1965. Groundwater Development in the East St. Louis Area, Illinois. Report of Investigation 51, Illinois State Water Survey, Urbana, 70 p.



NOTES

1. BASE MAP WAS DEVELOPED FROM GRANITE CITY, IL-MO AND MONKS MOUND, IL 7.5 MINUTE U.S.G.S. QUADRANGLE MAPS, DATED 1982 AND 1974 RESPECTIVELY.

2. REFER TO U.S.G.S. STANDARD LEGEND.

FIGURE 1

WARZYN

Scale: 1" = 3000'

Checked by: TDH

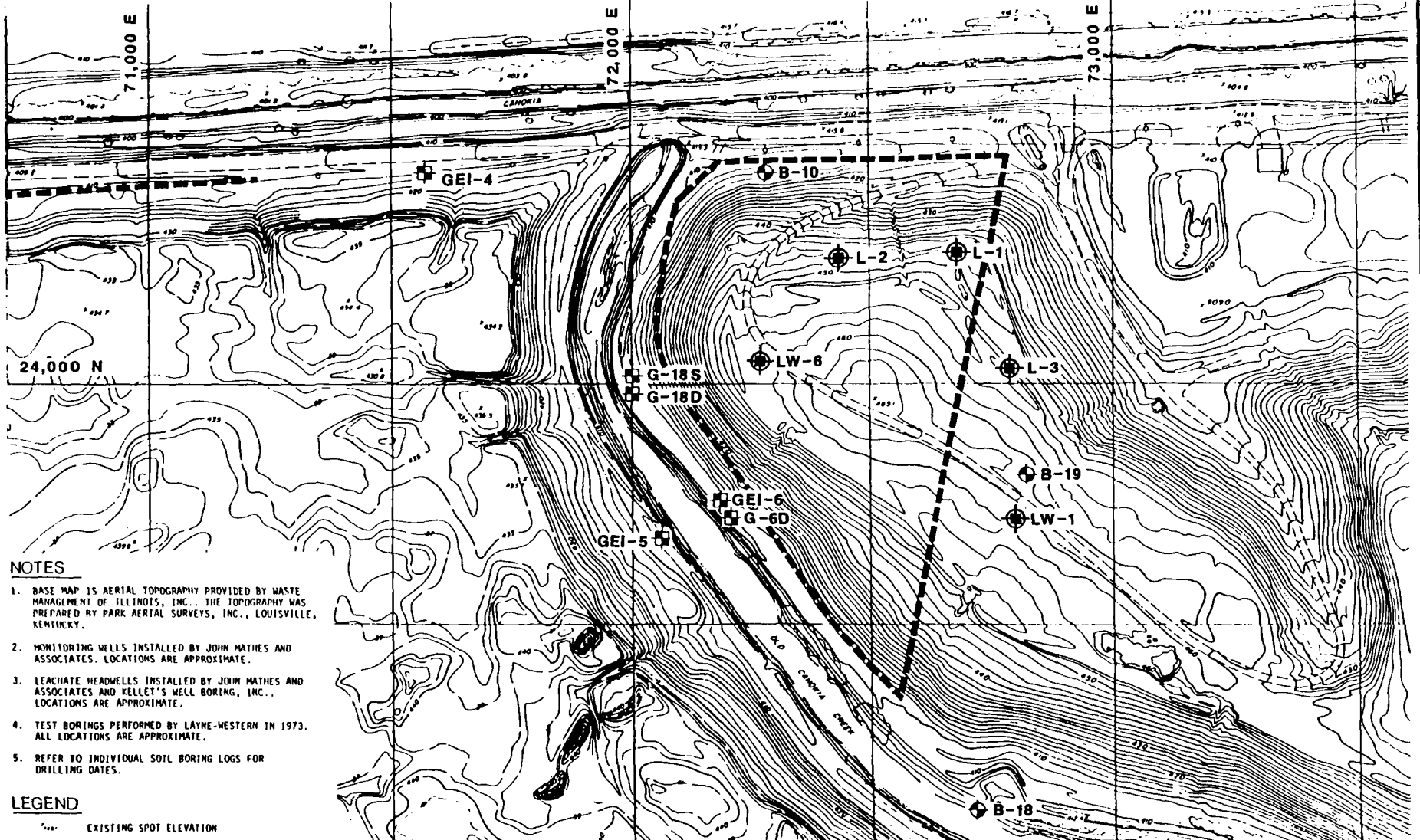
Date: 2/17/88

SITE LOCATION MAP

BARREL AREA ASSESSMENT
MILAM SANITARY LANDFILL
WASTE MANAGEMENT OF ILLINOIS, INC.
PART OF SECTION 1, T2N, R9W

Sheet Number: 1 OF 7

Project Number: 60180B19



NOTES

1. BASE MAP IS AERIAL TOPOGRAPHY PROVIDED BY WASTE MANAGEMENT OF ILLINOIS, INC.. THE TOPOGRAPHY WAS PREPARED BY PARK AERIAL SURVEYS, INC., LOUISVILLE, KENTUCKY.
2. MONITORING WELLS INSTALLED BY JOHN MATHES AND ASSOCIATES. LOCATIONS ARE APPROXIMATE.
3. LEACHATE HEADWELLS INSTALLED BY JOHN MATHES AND ASSOCIATES AND KELLET'S WELL BORING, INC.. LOCATIONS ARE APPROXIMATE.
4. TEST BORINGS PERFORMED BY LAYNE-WESTERN IN 1973. ALL LOCATIONS ARE APPROXIMATE.
5. REFER TO INDIVIDUAL SOIL BORING LOGS FOR DRILLING DATES.

LEGEND

- EXISTING SPOT ELEVATION
- EXISTING GROUND CONTOUR
- EDGE OF WATER
- BARREL AREA BOUNDARY
- G-18S MONITORING WELL LOCATION AND NUMBER
- LW-1 LEACHATE HEADWELL LOCATION AND NUMBER
- B-19 TEST BORING LOCATION AND NUMBER

LATERAL BOUNDARIES OF BARREL AREA
BARREL AREA ASSESSMENT
WASTE MANAGEMENT OF ILLINOIS, INC.
PART OF SECTION 5, T2N, R9W
CANTERA TOWNSHIP, ST. CLAIR COUNTY, ILLINOIS

WARZYN

1" = 200'

2 OF 7

60180 B20

FIGURE 2

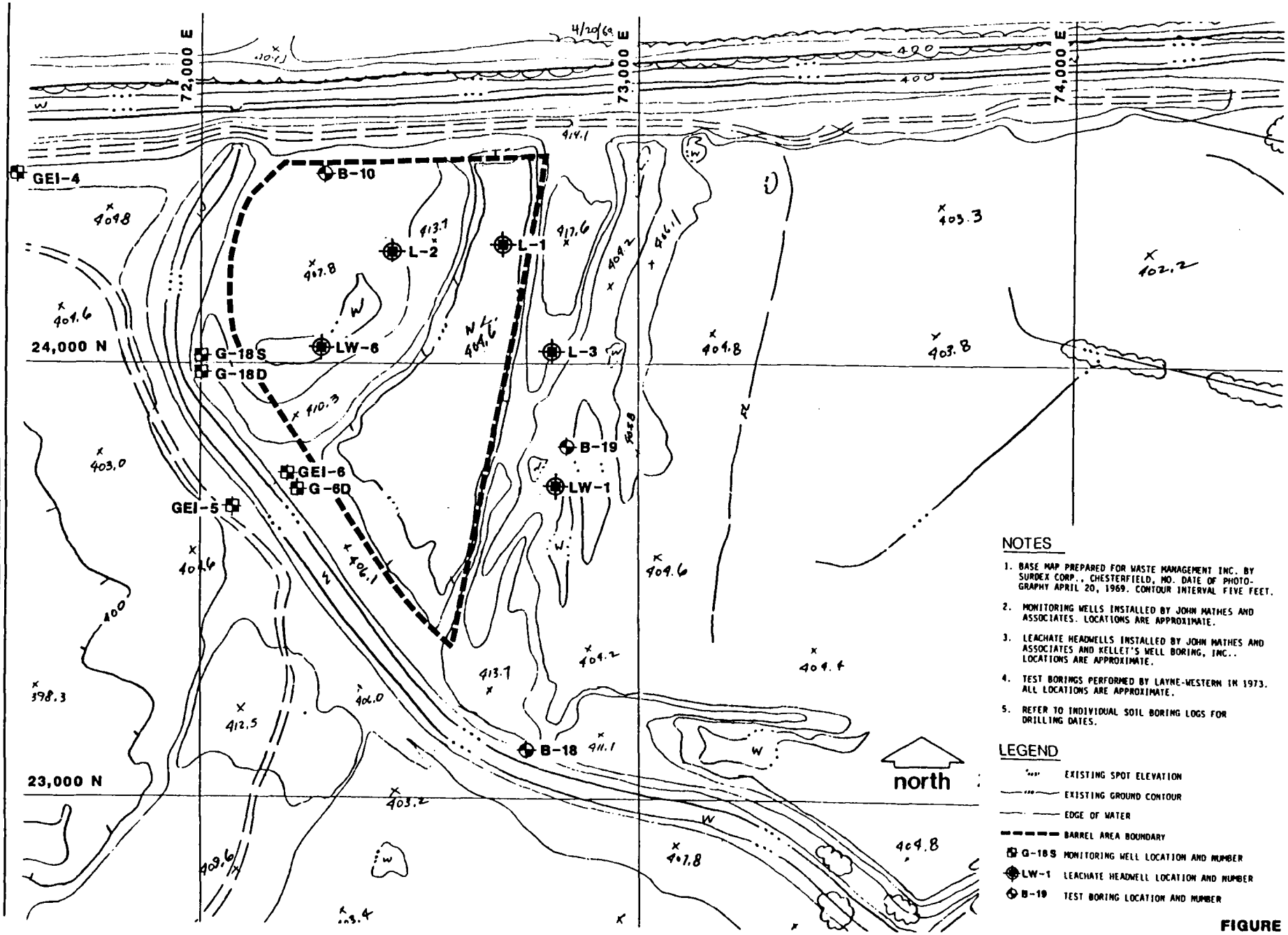


FIGURE 3

CONTOUR MAP OF BARREL AREA ON APRIL 20, 1969
BARREL AREA ASSESSMENT
MILAN SANITARY LANDFILL
WASTE MANAGEMENT OF ILLINOIS, INC.
PART OF SECTION 3, T2N, R6W
CANTEEN TOWNSHIP, ST. CLAIR COUNTY, ILLINOIS

Drawn by MAS
Checked by PCV
Date 7/27/82
Scale 1" = 200'

WARZYN

3 OF 7

60180B21

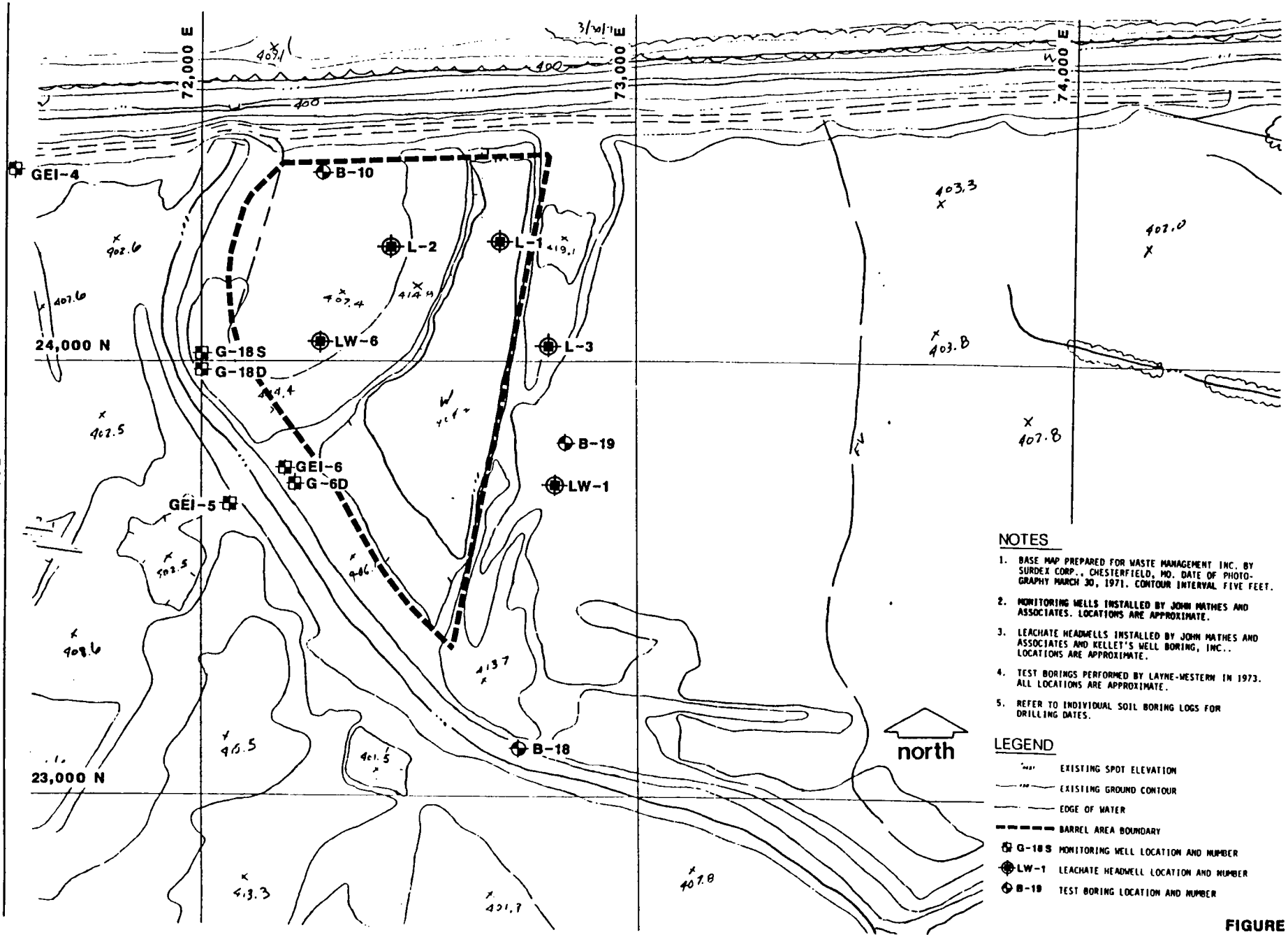


FIGURE 4

CONTOUR MAP OF BARREL AREA ON MARCH 30, 1971
BARREL AREA ASSESSMENT
MIAMI SANITARY LANDFILL
WASTE MANAGEMENT OF ILLINOIS, INC.
PART OF SECTION 5, T2N, R8W
CANTEEN TOWNSHIP, ST. CLAIR COUNTY, ILLINOIS

WARZYN ENGINEERING INC.
Madison • Chicago
Milwaukee • Chicago

Designed by
Drawn by MAS
Checked by DSL
Date
Scale 1" = 200'

4 OF 7

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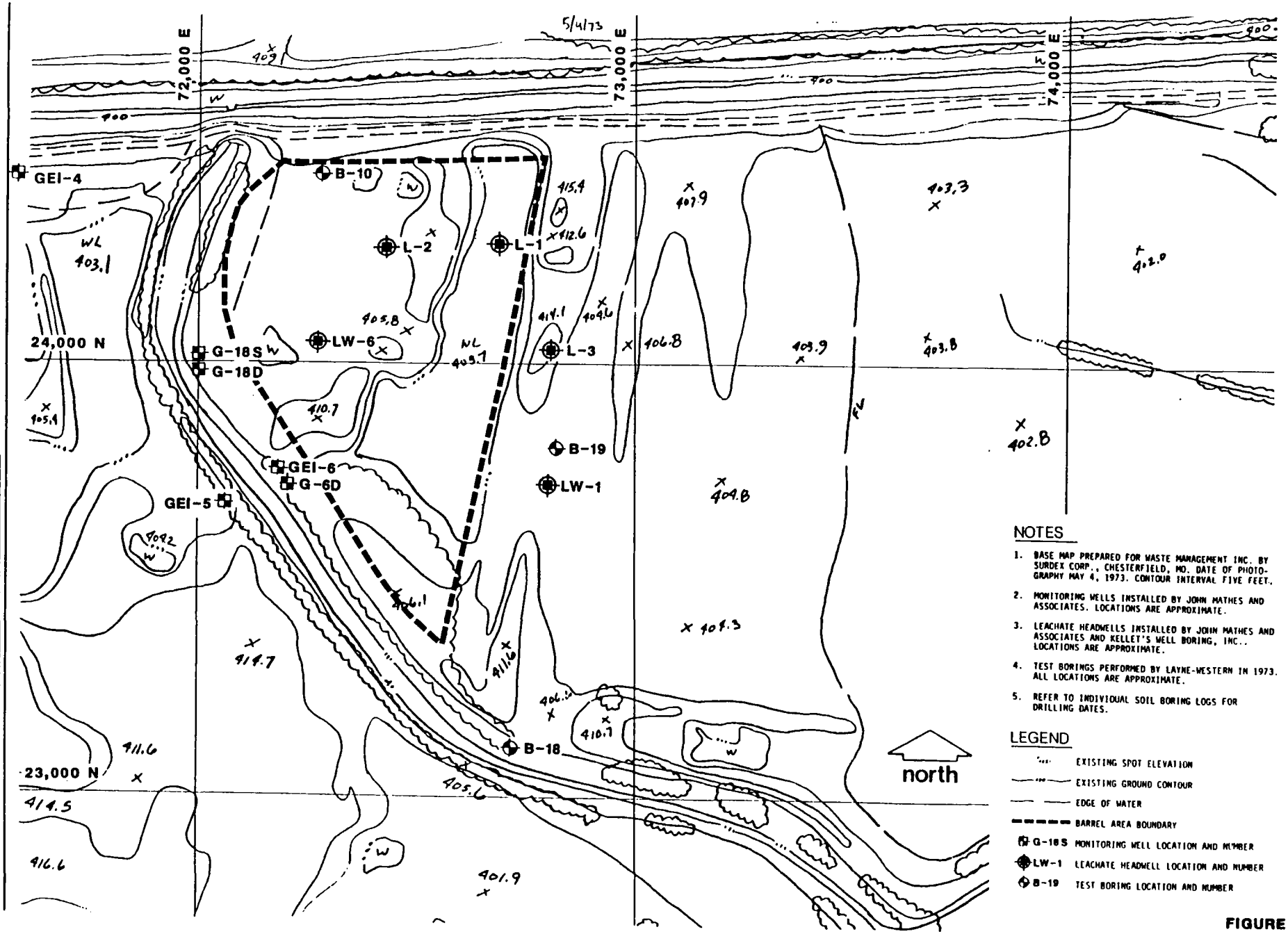
WARZYN



NOTES

1. BASE MAP PREPARED FOR WASTE MANAGEMENT INC. BY SURDEX CORP., CHESTERFIELD, MO. DATE OF PHOTOGRAPHY MAY 4, 1973. CONTOUR INTERVAL FIVE FEET.
2. MONITORING WELLS INSTALLED BY JOHN MATHES AND ASSOCIATES. LOCATIONS ARE APPROXIMATE.
3. LEACHATE HEADWELLS INSTALLED BY JOHN MATHES AND ASSOCIATES AND KELLET'S WELL BORING, INC.. LOCATIONS ARE APPROXIMATE.
4. TEST BORINGS PERFORMED BY LAYNE-WESTERN IN 1973. ALL LOCATIONS ARE APPROXIMATE.
5. REFER TO INDIVIDUAL SOIL BORING LOGS FOR DRILLING DATES.

LEGEND

- EXISTING SPOT ELEVATION
- EXISTING GROUND CONTOUR
- EDGE OF WATER
- BARREL AREA BOUNDARY
- G-18S MONITORING WELL LOCATION AND NUMBER
- LW-1 LEACHATE HEADWELL LOCATION AND NUMBER
- B-19 TEST BORING LOCATION AND NUMBER

FIGURE 5

CONTOUR MAP OF BARREL AREA ON MAY 4, 1973
BARREL AREA ASSESSMENT
MILAM SANITARY LANDFILL
WASTE MANAGEMENT OF ILLINOIS, INC.
PART OF SECTION 5, T2N, R8W
CANTEEN TOWNSHIP, ST. CLAIR COUNTY, ILLINOIS

Drawn by MAS
Designed by
Approved by
Scale 1" = 200'
Date 5/24/74

WARZYN ENGINEERING INC.

5 OF 7

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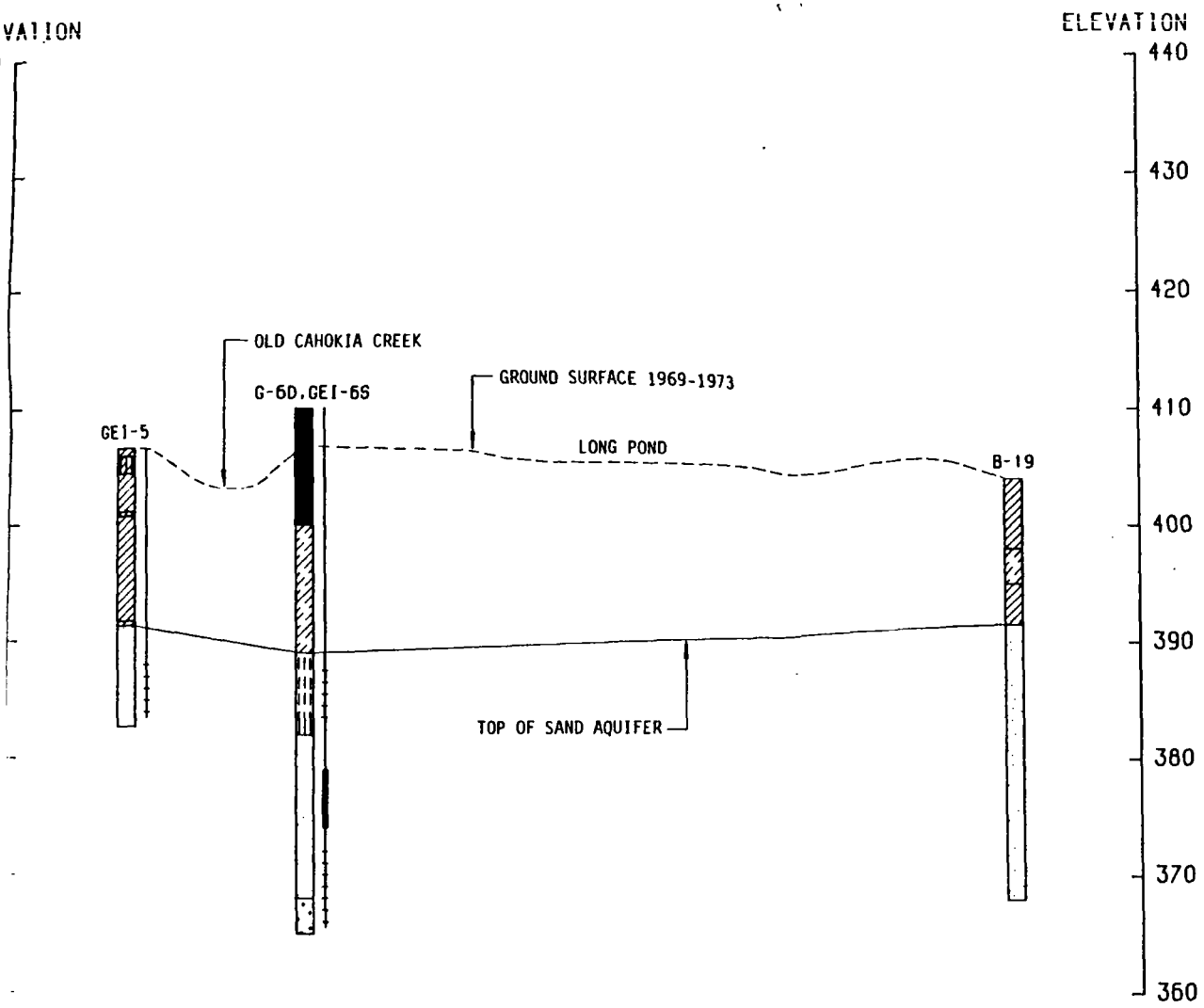
WARZYN

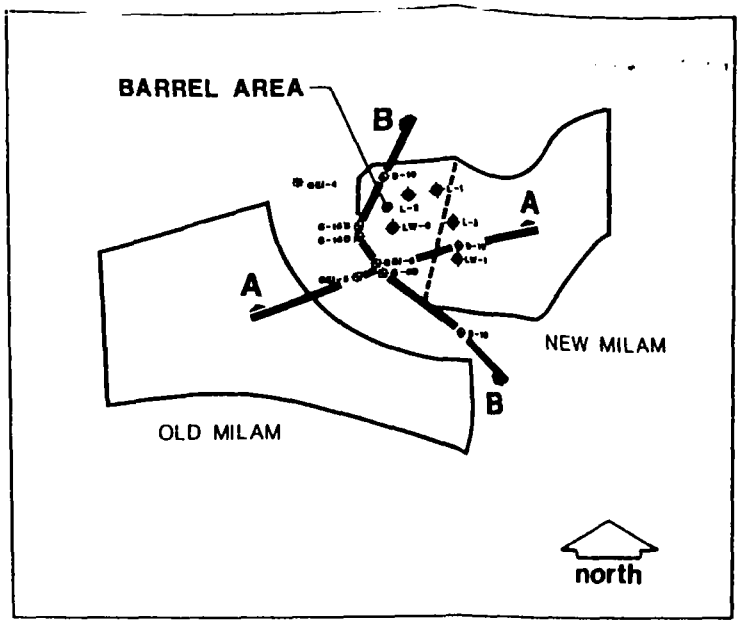
MASTER BLUE PRINT INC. 501324

VATION



SECTION A-A'

HORIZONTAL SCALE: 1"=100'
VERTICAL SCALE: 1"= 10'



CROSS SECTION LOCATION MAP

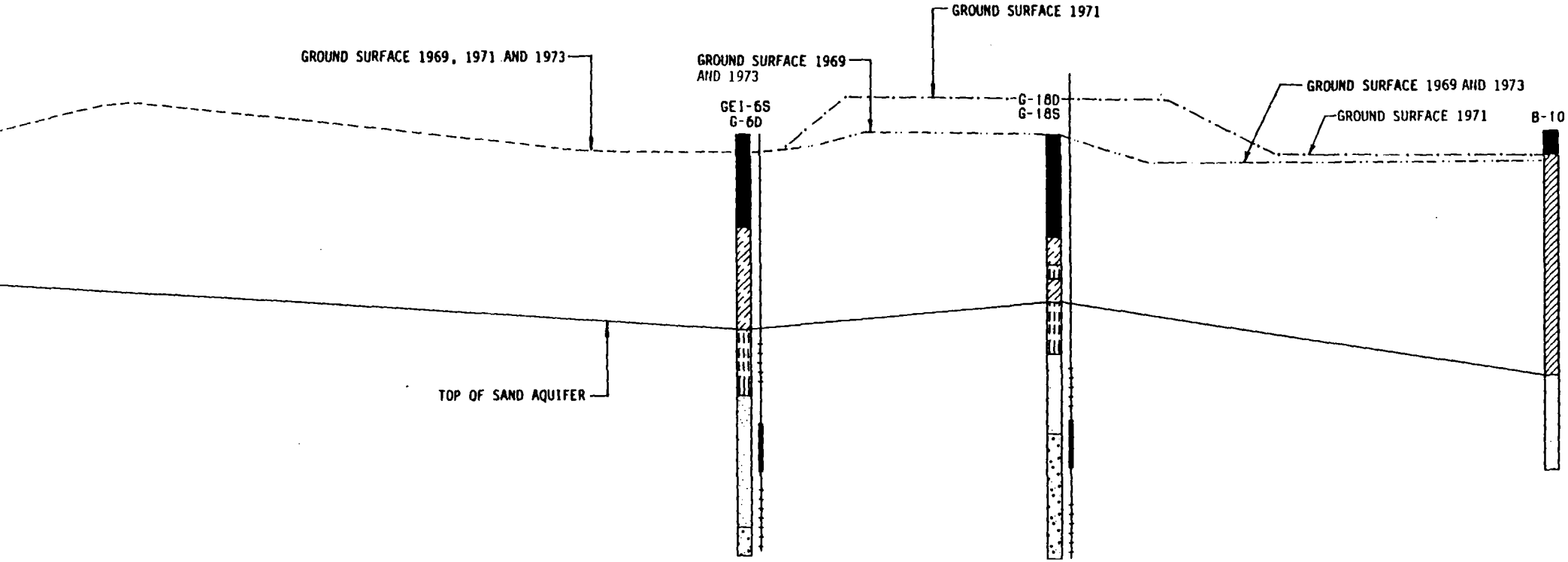
SCALE: 1"=1000'

NOTE

1. THE STRATUM LINES ARE BASED ON INTERPOLATION BETWEEN BORINGS AND MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.
2. FOR THE PURPOSE OF ILLUSTRATING SUBSOIL CONDITIONS ON THE CROSS SECTIONS, SOME OF THE BORING LOGS HAVE BEEN SIMPLIFIED. FOR A DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT INDIVIDUAL BORINGS, REFER TO SOIL BORING LOGS, APPENDIX B OF TEXT.
3. FOR COMPLETE MONITORING WELL INSTALLATION DETAILS, REFER TO APPENDIX B OF TEXT.
4. CROSS SECTIONS HAVE BEEN EXAGGERATED TEN TIMES.
5. HORIZONTAL DISTANCES ARE MEASURED WITH RESPECT TO THE CENTER OF EACH SOIL BORING LOCATION.
6. EXISTING GROUND SURFACE WAS TAKEN FROM FIGURES 3, 4 AND 5, FURNISHED BY SURDEX CORP., DATED APRIL 20, 1969, MARCH 30, 1971, MAY 4, 1973.
7. ELEVATIONS ARE SHOWN IN U.S.G.S. DATUM.
8. EACH MONITORING WELL IS INSTALLED IN SEPARATE BOREHOLE.

LEGEND:

- FILL/RE
- SILTY C
- HIGHLY
- SILT (M
- SILTY S
- SAND (S
- SAND AN
- CLAYEY
- BENTONI
- WELL SC



SECTION B-B'

HORIZONTAL SCALE: 1"=100'
VERTICAL SCALE: 1"= 10'

NOTE

1. REFER TO FIGURE 6 FOR CROSS S
NOTES, LEGEND AND MONITORING

APPENDIX A

IEPA CORRESPONDENCE

Illinois Environmental Protection Agency · 2200 Churchill Road, Springfield, IL 62706

217/782-6760

June 25, 1987

Mr. Richard Molenhouse
Waste Management of Illinois
P. O. Box 563
7300 West College Drive
Palos Heights, Illinois 60463

Dear Mr. Molenhouse:

Waste Management Inc. (WMI) submitted clarifying comments and modifications to the CRARP subsequent to the Agency's February 4, 1987 review letter. The following comments were drafted during a review of that proposal by the Illinois Attorney General's Office, Illinois Environmental Protection Agency and the county of St. Clair:

1) The areas of Old Milam not receiving additional fill will be regraded to ensure a compacted two-foot soil cover exists which is capable of supporting an additional 36" of cover as shown in Alternative A, drawing number C600180-B15 of the CRARP. However the barrier layer will consist of two (2) feet of compacted clay in lieu of the proposed one (1) foot layers.

2) The following requirements should be imposed for the new waste cell on top of Old Milam:

A) The area will be stripped of all vegetation and regraded to ensure a two foot compacted clay layer exists before further development.

B) WMI must commit to a base elevation for the waste cell prior to development.

C) The lateral boundaries of the new cell will be limited to the proposed contours of 440 feet MSL and 430 ft. MSL for the SE portion as depicted in drawing C600180-B11.

D) The vertical limits will be controlled by a 6% slope directly off the three (3) foot perimeter dike in the area north of the 2300N grid line and an 8% slope south of that line. The proposed 5:1 slope off the three (3) foot perimeter dike shall be eliminated.

E) The liner for the waste cell should consist of one foot of clay compacted to an Agency approved density with a synthetic liner in addition to the regrading procedures in A above.

F) The leachate collection system should include lateral drainage pipes extending from the perimeter collection system. A sufficient number of sumps should be included for adequate leachate removal. A schedule for leachate removal should be included in a facility leachate management plan.

G) The cap for the new cell will be 60 inches thick as illustrated in Alternative A, drawing C600180-B15, except the barrier layer should consist of two (2) feet of compacted clay.

3) A leachate management plan should be developed for the entire facility. The plan should address leachate removal in Old Milam, New Milam, the new waste cell and the leachate seeps along the creek. The plan should include a schedule for regular leachate withdrawal and inspections. Maximum leachate accumulation levels should be established.

4) Additional assessment of the groundwater at the old barrel area should be as follows.

A) Two wells, one deep and one shallow should be installed at coordinates 24000N and 72000E. The wells should be constructed in the same manner and of the same materials as the GEI series wells with five (5) foot screens. The top of the screens should be at approximately 385 feet MSL and 370 feet MSL.

B) An additional deep well should be installed at the location of GEI 6 with the same criteria as the deep well required above in (A).

C) After three twice a month sampling events, WMI will submit an assessment of groundwater in the old barrel area and include remediation and/or containment of any contamination detected.

5) A shallow well will be installed at approximately 388 feet MSL at GEI17. The well will be constructed in the same manner and of the same materials as the GEI series wells. The well should have a 5 foot screen.

6) The leachate wells should be fully screened and fully penetrate the fill. Although a more simplistic approach than the WMI proposal, fully screened wells will allow drainage of any perched leachate within the fill. The leachate level in the wells should be maintained at the designated level and pumped down on a regular schedule. This approach alleviates the expense and time required of the proposed leachate study.

7) The final agreement should contain a schedule based on the development of the approved plans to ensure remediation progresses with or ahead of the landfill development.

8) The Agency will allow WMI to move Old Cahokia Creek.

9) A sufficient number of gas vents will be installed on Old and New Milam.

10) The Old Milam project will require siting and handled under a state permit.

11) Area IIB permit application with indefinite time waiver will be reviewed by the Illinois Environmental Protection Agency. Issuance of the permit will be based on:

A) Environmental acceptability
B) Concurrence by the Illinois Attorney General's Office
C) Resolution of need from the St. Clair County Board.

12. New Milam will be filled to the final contours illustrated on drawing C6001808-11 of the CRARP.

13) Agreement on the final technical documentation must be reached by all parties prior to this remediation plan being instituted as part of the Consent Decree.

If WMI is willing to accept these conditions, we will consider modification of the Consent Decree to allow continued operation of the Milam facility for a determinate period of time. The Illinois Attorney General may agree to a month extension of the Consent Decree in order to reach final agreement on the unresolved technical issues.

Respectfully,

William C. Child

William C. Child, Manager
Division of Land Pollution Control

WCC:mg/28

cc: Division File
Permits
Harry Chappel
Attorney General's Office
Paul Jagiello
Ken Mensing
Glenn O'Brien

Illinois Environmental Protection Agency 2200 Churchill Road, Springfield, IL 62706

MEMORANDUM

DATE: August 13, 1987

TO: Robert W. Mueller, Assistant Attorney General

FROM: William C. Child, Manager, DLPC, IEPA

SUBJECT: Milam Landfill

The Agency has reviewed the material submitted by Philip L. Comella, Environmental Counsel for Waste Management Inc., dated July 28, 1987, and the Modifications to the Comprehensive Remedial Action and Removal Plan, dated August 9, 1987. The Agency feels that along with the 60 day time extension to the consent decree, the following requirements should be included.

1) Waste Management Inc. shall submit to the Agency plans and specifications for planned expansions at Old Milam Landfill and New Milam Landfill within 30 days of this consent decree amendment. This submittal must address, at a minimum, the regrading and cap at Old Milam Landfill, expansion of Old Milam and New Milam Landfills, final cover and final contours at Old Milam and New Milam Landfills, and the leachate collection system for the new cell on top of Old Milam Landfill.

2) Waste Management Inc. shall start siting procedures for the proposed expansions at Old Milam and New Milam Landfills within 30 days of this consent decree amendment.

3) Waste Management Inc. shall submit to the Agency plans and drawings for closure of Old Milam Landfill and New Milam Landfill for conditions that will exist if siting for expansion is not approved (to include minimum slope, minimum cover, cover contours, etc.). This shall be submitted to the Agency within 30 days of this consent decree amendment.

4) Waste Management Inc. shall within twenty (20) days of this consent decree amendment install at least 5 leachate removal wells at both Old Milam Landfill and New Milam Landfill (total of at least 10 wells) and begin initiation of a leachate removal program for Old Milam Landfill and New Milam Landfill to effect an inward gradient for Old Milam Landfill and New Milam Landfill. Any leachate removed shall not be reintroduced into the site, but will be disposed of off-site at an Agency permitted facility. Within 45 days of this consent decree amendment, Waste Management Inc. shall submit to the Agency As-Built drawings of the wells, submit pumping and leachate level records, compare leachate levels to the surrounding groundwater elevation, and a final plan for leachate removal at Old Milam Landfill, New Milam and Old Cahokia Creek.

5) Waste Management Inc. shall within 30 days of this consent decree amendment submit to the Agency a description in detail of a gas venting system for Old Milam Landfill and New Milam Landfill that, in particular, addresses; (a) The definition of "vegetative stress"; (b) How and who will determine when vegetative stress exists? (c) What criteria will be used to determine what extent of vegetative stress will result in what extent of a gas venting system? (d) What other indicators of gas migration besides vegetative stress will be evaluated when determining the need for a gas venting system? (e) Alternatives to simply venting collected gas shall be described, investigated, and compared based on technological feasibility and economic reasonableness.

6) Within 45 days of amending the Consent Decree, Waste Management Inc. shall install three (3) groundwater monitoring wells for the additional assessment of the groundwater at the Old Barrel area. The wells shall be constructed with five (5) foot screens and installed in the same manner and of the same materials as the GEI series wells. The locations of the wells shall be as follows:

   A) One (1) deep well shall be installed at the location of the current well GEI-6 with the top of the screen at approximately 370 feet mean sea level (MSL).

   B) Two (2) wells; one deep and one shallow shall be installed at coordinates 24,000 N and 72,000 E as taken from drawing C600180-B11, CRARP dated November 1986. The top of the screens shall be located at approximately 385 feet MSL and 370 feet MSL respectively.

In the event that Cahokia Creek has been rerouted, the wells in (B) above may be moved along the 24,000 N grid line no more than 50 feet from the designated location.

The wells shall be developed and sampled within 14 days of installation for the Priority Pollutants List including the pesticides, radionuclides and PCBs. The latter parameters (pesticides, radionuclides, and PCBs) will be dropped if not detected after two consecutive sampling events.

The boring logs, as built diagrams and first sample results shall be submitted to the Agency within 60 days of the initial sampling.

WC:GTRjd/3286g/85-86

cc: Lawrence W. Eastep
Harry Chappel
Southern Region
Division File
Linda Kissinger
Paul Jagiello
Charles Zeal
Ken Liss

APPENDIX B

BORING LOGS AND MONITORING WELLS SPECIFICATIONS

Client Waste Management, Inc. Boring No. GEI-6

Project Installation of Monitor Wells Sheet 1 of 3

Location Milam Sanitary Landfill, East St. Louis, Illinois File No. 7034

Drilling Contractor John Mathes & Associates, Inc.

Inspector MAP Date Started 03/01/85

Surface Elev. 410.0 ft. (MSL) Date Completed 03/02/85

SAMPLE NO.	SAMPLE REC.	BLOWS /12"	DEPTH (FT.)	SOIL TYPE	SOIL DESCRIPTION
			0		
					CLAY (observed).
			2.5		
				(fill)	
					Garbage from approximately 3.5 ft. (observed).
			5		
S-1	10"	6			Mixture of clay and garbage, with strong odor.
			7.5		
S-2	21"	9		CH	Medium gray, stiff, CLAY, with tan to orange/brown staining, and with occasional shells; strong odor.
			10		

SAMPLER TYPE: ▼ - 3-3/4" I.D., 5' split spoon, ▼ - standard split spoon.

BORING METHOD: 12" O.D. HSA to 18'; 7" O.D. HSA thereafter.

GeoEngineering, Inc.

Project Installation of Monitor Wells — Boring No. GEI-6
File No. 7034 — Sheet 2 of 3

SAMPLE NO.	SAMPLE REC.	BLOWS /12"	DEPTH (FT.)	SOIL TYPE	SOIL DESCRIPTION
			10		
S-3	60"	pushed		CH	As above, with occasional short root channels; with shiny appearance; blackish stains between 12' and 14'; strong odor throughout sample.
			12.5		
			15		
S-4	36"	pushed			Medium gray, CLAY, with occasional shells; with frequent short, filament-like roots and occasional weathered chunks of wood; lesser odor - scarcely detectable toward bottom of sample.
S-4A					(S-4A is jar sample from near bottom of sampler.)
			17.5		
S-5	7"	7		SP	Medium gray, loose, fine SAND, trace Silt.
			20		
			22.5		

GeoEngineering, Inc.

Project Installation of Monitor Wells Boring No. GEI-6
File No. 7034 Sheet 3 of 3

SAMPLE NO.	SAMPLE REC.	BLOWS /12"	DEPTH (FT.)	SOIL TYPE	SOIL DESCRIPTION
			22.5		
S-6	11"	17		SP	Medium gray, medium dense, fine SAND, trace medium Sand, trace Silt.
			25		
			27.5		
					Boring terminated at 28 ft. Well screened 22.2-27.2 ft.
			30		
			32.5		
			35		

GeoEngineering, Inc.